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VOLUME XLVIII DECEMBER, 1928 NUMBER 12

NITROGENOUS FERTILIZERS In APPLE ORCHARDS

Trees on right fertilized with nitrogen annually for 12 years, trees on left unfertilized. Fertilized trees are three times as large and have yielded two to three times as much during this period as the unfertilized trees.

Application of Nitrogenous Fertilizers to Apple Trees Has Shown Such Noticeable Results in Tree Growth, Luxuriant Foliage and Prodigious Yields That There Is Danger of Over-Application. The Grower Who Does Not Use This Class of Plant Food Will Profit Immensely by Doing So. But the Grower Who Has Profited by the Moderate Use of Nitrogen Carriers Should Guard Against Over-Enthusiasm.

By H. E. KNOWLTON

West Virginia University

THOSE familiar with apple orcharding in the United States will agree that the use of readily available nitrogenous fertilizers has revolutionized methods of culture for this fruit. This is particularly true in those apple growing sections where soils are shallow and poor and the topography is such that cultivation cannot be practiced because of soil erosion. In these localities nitrogen was the chief need and when trees were supplied with it they responded with luxuriant foliage, increased growth and almost prodigious yields. Unquestionably the maintenance of total production of apples in the United States during the past 15 years in spite of a marked decrease in total number of trees, has been due in large measure to the use of such fertilizers.

With such wonderful results from the use of nitrogenous fertilizers many growers began to feel that if a little nitrogen would do so much, more of it would give still more marvelous results. And so they have applied excessive amounts with results in many instances which were harmful. Some of these bad effects which have been evident in the Shenandoah-Cumberland Valley orchard region, are, inability of excessively nitrated trees to withstand drought, greater susceptibility to fire blight, and reduction of color of fruit. It may be well, therefore, to review briefly some of the effects of nitrogen fertilization on apple trees.

Probably the greatest effect of a quickly available nitrogen fertilizer from the practical standpoint is on total yield. In one West Virginia sod orchard yield was increased 200 to 300 per cent. This was on a shallow soil low in fertility and is an extreme case. In most sod orchards on average soils, yield increases will perhaps not be over 50 per cent. In cultivated orchards on good soil the increase may be still less. Still one is safe in making the generalization that on most apple orchards in the United States the application of such fertilizers will markedly increase yield particularly when measured over a number of years.

This increase in yield when analyzed is found to be caused by increased set of fruit and by more regular blooming. In the experiment noted above fruit set was increased 20 to 70 per cent, depending on the season, while bloom was increased on the average about 50 per cent. Most orchards, however, will not exhibit such marked responses.

On orchards that need nitrogen, the application of it always results in greater terminal and spur growth and increases in girth. This is strikingly shown by the orchard shown in the picture where nitrogen applications so increased growth that the trees were two to three times as large after 12 years.

Excessive applications may have harmful effects. On young trees growth may be so great that an over-vegetative condition is produced which may delay fruitfulness. On soils that are shallow and not retentive of moisture, heavily fertilized trees may suffer more from lack of moisture during drought periods than trees not fertilized. This was very evident in one of the experimental plots of the West Virginia Agricultural Experiment Station during a dry spell in the summer of 1924. The leaves on these trees were actually wilted while those on unfertilized trees were normal in appearance. The explanation probably lies in the excessively large leaf surface borne by the trees fertilized with nitrogen.

Many growers have the erroneous impression that quickly available nitrogen fertilizers increase size of fruit. The writer has never seen any experimental evidence for this. On extremely poor soils apple trees may be making such poor growth and bearing such sparse foliage that little available elaborated food is present for fruit tissue production. In such cases nitrogen may increase size. With orchards of average soil fertility, however, little or no increase in size will result. In fact, the fruit may be smaller if there is a moisture deficiency. In

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SULPHATE of AMMONIA and its USE In GROWING FRUIT

The Nitrogen Content of Antedeluvian Forests Becomes Available to the Modern Fruit Grower Through the Manufacture of Coke. One of Our Most Valuable Nitrogenous Fertilizers.

By C. G. ATWATER

Agricultural Bureau, The Barrett Company

MANY fruit growers use sulphate of ammonia with success on their orchards, either to furnish nitrogen in the commercial mixtures they apply or as a separate top-dressing. Comparatively few of them know where it comes from and how it is produced. While many of them have heard of the various complex and valuable substances obtained from coal, such as dyes, chemicals, roofing, waterproofing, road materials, automobile fuels, and explosives, they are not aware that fertilizers are also included in the category of coal products. It is a fact, however that sulphate of ammonia, one of the best-known and widely used nitrogenous fertilizer chemicals, is obtained from the by-product ovens in which bituminous coal is made into coke. The nitrogen in the coal is driven off when the coal encounters the coking temperature, upwards of 2,000 degrees Fahrenheit, and it passes into the oven gas as ammonia. In this gas, which is nothing more nor less than ordinary coal gas, the ammonia is considered as an impurity which must be removed before the gas is usable, and the process of purifying the gas results, among other things, in the production of sulphate of ammonia.

The original presence of nitrogen in the coal is of special interest from an agricultural point of view. We know that coal is the remainder of the vast forest growth of the carboniferous age. Like the trees and plants of the present day, their growth required nitrogen to nourish it, and this nitrogen formed a part of their composition. When floods and shiftings of the earth's surface piled up great beds of forest debris and covered them with beds of rock and earth, the pressure and heat gradually transformed the vegetable remains into coal. This coal retained the nitrogen, absorbed in the original growth, and this nitrogen is given off as ammonia when the coal is carbonized. Thus the fertility stored up under the sunshine of that far-off age, hidden for centuries in the earth, comes again to light and air and returns to the cycle of growth and to the service of man.

Each ton of bituminous coal treated in the by-product coke oven yields about 21 pounds of sulphate of ammonia, and to such great dimensions has the coke industry grown that the recovery of ammonia from coal in 1927, expressed as sulphate of ammonia, amounted to over 700,000 tons in the United States alone. The world production of sulphate of ammonia from coal is given as upwards of 1,500,000 tons per year, and there is an equal amount made by the synthetic process. Since practically all of this is used as a fertilizer, it is estimated that more nitrogen is used in the form of sulphate of ammonia than in any other fertilizer chemical. Up to the present time it is the only nitrogenous fertilizer chemical produced in our own country in sufficient quantities to be important in agriculture.

How Ammonia Is Recovered

The actual recovery of ammonia from the coke oven gas is relatively simple. After the gas leaves the oven, it is conducted to coolers, where the heat is absorbed by water or air, and then to a tar extractor, where the fine mist of tar in the gas is removed. The clean gas at a temperature of about 70 degrees Fahrenheit is forced by a rotary blower through the saturator, which is a large lead-lined vessel containing dilute sulphuric acid. The gas is bubbled through this acid, and the affinity of the ammonia for the acid eliminates the former completely from the gas. Sulphate of ammonia is formed, and crystallizes out in the bath, from which it is removed by a suction device, drained and dried in a centrifugal machine. It is then ready for shipment as ordinary commercial sulphate, to be used in mixed fertilizers. Where it is to be applied by itself, a final drying in a rotary kiln is necessary to eliminate lumps and insure ready distribution. In this form it is known in the trade as Arcadian sulphate of ammonia. An experiment has been conducted in the past six years in an orchard of 24-year-old York Imperials, growing in non-legume soil, in Pennsylvania. Sulphate of ammonia was applied at the rate of three and five-eighths, seven and one-quarter and 10⅞ pounds per tree each year, the application being extra early (first week in April), early (the last week in April) and about June 1. The earlier applications were made about three to four weeks before blossoming, or at the time of the delayed dormant spray. The yield record of four years, the nearest even number for which the data is available, is given in Table I (see page 00).

(Above)—York tree which has received no nitrogen. Yield, three-fourths bushel. Note that leaves are practically gone at time of harvest.
(Below)—York tree which has received 10⅞ pounds sulphate of ammonia annually for four years. Yield, 16¾ bushels. Note that the leaves are still on at time of harvesting, indicating vigor.

Table I (see page 16).

It will be noted that the higher yields for similar amounts of fertilizer correspond in each instance to the early application. The general effect on the fertilized trees and, in fact, on that portion of the orchard which also received nitrogen in corresponding quantities, was to greatly increase the vigor and thrift of the trees, and to regulate and increase the yield. In fact, the off-bearing habit of the York Imperial has hardly been in evidence during the six years. There was also a notable increase in the growth and quality of the bluegrass sod.

The data for the nitrogen fertilized portion of the whole orchard for the four years is given in Table II (see page 00).

in Table II (see page 16).

While the table shows that the trees were averaging good yields, it also brings out clearly the higher yield resulting from the higher nitrogen application. While the gain between the single and double application averages a little more, that between the double and triple amount is high enough to be satisfactory from a commercial point of view. Of prime importance also is the evident increase in growth of the sod, as such growth builds up a reserve of organic matter in the soil that will bear fruit in the years to come.

Another test of similar character is one that has been carried on for five years by F. H. Ballou, associate in horticulture, Ohio Experiment Station, at the Clermont County Experimental Farm. This test affords a comparison between two nitrogen fertilized plots, one in sod mulch and the other in tillage-cover crop, each plot containing 48 trees, with two check plots of 32 trees. *(To page 16)*

TAKING NITROGEN from the AIR

Although Our Atmosphere Is About Three-Fourths Nitrogen, This Element Must Be Combined With Some Other Element to Form a Water-Soluble Salt Before It Can Be Absorbed by the Feeder Roots of Vegetation. This Paper Outlines the Methods Used in Atmospheric Nitrogen Fixation, and Tells How the Various Forms of Synthetic Nitrogenous Fertilizers are Manufactured.

By B. G. SOUTHWICK

Synthetic Nitrogen Products Corporation

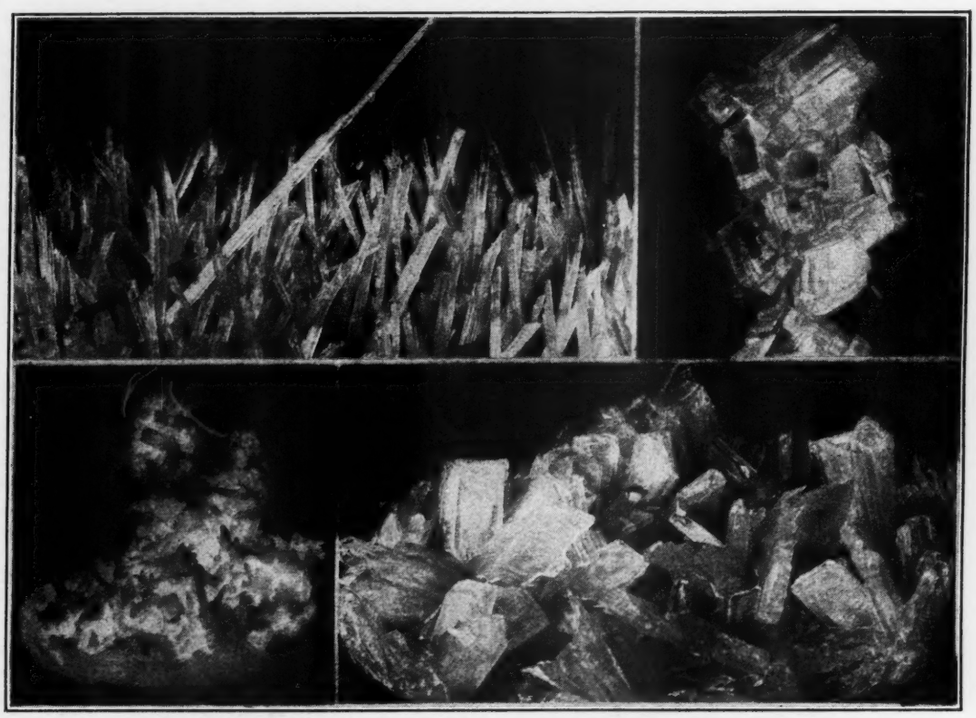
DEPENDING for existence on air, water and coal, an enormous industry of vital interest to all mankind has rapidly developed in the past 10 years. Nitrogen, the most essential plant food element, is now manufactured from the inexhaustible supply in the atmosphere. Science has found ways of producing a form of nitrogen for every need of plants. Nitrates, ammonia, and organic forms are being made "synthetically" in large quantities. Already these air-nitrogen, manufactured forms equal 56 per cent of the world's consumption of nitrogen.

When most of us think about the air we think first of the oxygen it contains, as we learned about this in our schoolhood days. Actually about four-fifths of the air is nitrogen. If this were not so, we and other animals on the globe would be unable to breathe the air, as the oxygen would be too concentrated. This universal wealth of nitrogen has for a century been the substance of many a chemist's dreams. How to convert this nitrogen into suitable forms for fertilizer and technical use was a baffling problem only recently solved.

The manufacturing of air-nitrogen requires complicated chemical equipment and processes. But the fundamental steps in these processes can be described so that those without technical chemical knowledge can grasp the main ideas of how nitrogen is taken from the air.

The first two fundamental necessities for making air-nitrogen fertilizer are two ordinary every-day materials, namely air and water. These are the two essentials in the nitrogen fixation process most extensively used. An industry based on air and water cannot run short of raw material, or have difficulty in obtaining adequate quantities.

Another essential is coal for heat, power and carbon. This coal must be inexpensive, also of proper composition. Of course, other supplies are important as raw materials, as well as adequate and elaborate equipment for economical production of air-nitrogen fertilizers.



SYNTHETIC NITROGEN CRYSTALS.
At top, left, UREA; right, NITRATE OF SODA. Bottom, left, AMMONIUM CHLORIDE; right SULPHATE OF AMMONIA.

Now let us consider what each of these materials furnishes to make up our air-nitrogen fertilizer. Obviously the air furnishes the nitrogen. The water furnishes hydrogen. These are combined to produce ammonia, as one part of nitrogen combined with three parts of hydrogen makes what is chemically known as ammonia. If this is dissolved in water, it becomes ordinary well-known household ammonia. Producing ammonia by combining nitrogen with hydrogen is the first step in making air-nitrogen.

This chemical union is obtained by first getting pure nitrogen and pure hydrogen, then bringing them together under pressure and heat in the presence of the proper metal alloys or catalysts. The action of these catalysts is not easy to describe. The main point to remember is that suitable catalysts or metal alloys, under the right conditions, make the union of nitrogen and hydrogen easier and more economical.

In making air-nitrogen fertilizer, the production of ammonia is the first process. This ammonia can be combined with other materials and in this way put into fertilizer form. Sulphate of ammonia is one of the fertilizers made synthetically and used in large quantities. In producing sulphate of ammonia, the ammonia is combined with finely pulverized gypsum, or land plaster, and the result is sulphate of ammonia, with the by-product of precipitated lime. This synthetic sulphate of ammonia contains no free acid and is a pure white crystalline salt of excellent fertilizing properties.

Ammonia can be burned or oxidized, which means that it is united with oxygen. This reaction produces nitrogen in nitrate form which in turn is combined with various bases like calcium to form calcium nitrate, or with potassium to make nitrate of potash, or it can be combined with ammonia to produce ammonium nitrate. If this ammonium nitrate is combined with sulphate of ammonia, the product will be chemically ammonium-sulphate-nitrate, but in the trade, this material is known as Leunasalpeter and contains 26 per cent nitrogen, with one-fourth of the nitrogen in nitrate form, and three-fourths in the form of ammonia.

One of the most interesting synthetic fertilizers for the fruit grower is calcium nitrate, or nitrate of lime. In producing calcium nitrate, the ammonia is first oxidized into nitrate form and then when in solution it is used to treat a high grade of calcium limestone. Upon evaporation and with the addition of a little ammonium nitrate, the product becomes calcium nitrate, containing 15 per cent nitrogen and soluble calcium equal to that in 28 per cent lime. This calcium nitrate is a white granular material (very soluble and available), that gives quick, effective results when used as fertilizer for orchards. It is one of the few fertilizers carrying soluble calcium. This calcium or lime is actually a plant food that all crops need, and in which many soils are deficient.

Another air-nitrate of interest to orchard men is nitrate of potash, or potassium nitrate, or "saltpeter." Nitrate of potash made synthetically is a white crystalline material very pure in form and containing 13 per cent nitrogen, combined with 44 per cent potash. Still another nitrate form of air-nitrogen is produced that also contains potash. This is made by combining ammonium nitrate with potash. The product resulting from this combination is called potassium ammonium-nitrate. This fertilizer contains 16 per cent nitrogen, half of which is in nitrate form and half of it in ammonia form. In addition to the nitrogen, it contains 28 per cent potash.

Organic Form of Air-Nitrogen

Urea is the most unique of all the air-nitrogen fertilizers. It is an organic nitrogenous material made synthetically, and not produced by either plant or animal action. Urea contains no mineral acid or alkali and consists only of carbon, nitrogen, oxygen and hydrogen. Urea is made by combining ammonia gas with a combination of carbon and oxygen. Under the right conditions of temperature and pressure, a chemical reaction occurs that produces an organic compound, known chemically as urea.

This nitrogenous material is identical with that found in liquid manure, and for crop producing purposes it has a similar action. It feeds crops in a very even and complete manner, and it leaves no residue of any kind in the soil to be troublesome in the future. Urea contains 46 per cent nitrogen, being the highest test form of air-nitrogen fertilizer made. Experimental work has shown urea to be an especially desirable form of nitrogen for vegetables and many fruit crops, as well as for pastures, meadows and tobacco.

A new air-nitrogen fertilizer has recently been put on the market under the trade name of Calurea. This is a chemical combination of urea and calcium nitrate and contains 34 per cent nitrogen, one-fifth being in the form of nitrate, and four-fifths as organic nitrogen in the form of urea. Calurea combines two very important fertilizer nitrogen forms into one material. The nitrate form gives a quick stimulating effect, and urea an even continuous feeding that produces high quality crops and remarkably good results. It can be successfully used to replace expensive forms of organic nitrogen, like fish, tankage, dried blood, etc.

We have described how air-nitrogen is combined with potash to produce fertilizer materials that carry two plant foods in one substance. Ammonia also is combined with phosphoric acid to produce diammonium-phosphate, which in *(To Page 13)*

The USE of NATURAL NITRATES In FRUIT PRODUCTION

One Striking Example of the Profitable Use of Nitrogenous Fertilizer, in This Paper, Shows Excess Apple Production in the Proportion of About One Bushel of Apples for Each Pound of Nitrate Used. An Argument for the More General and Intelligent Use of Nitrogenous Fertilizers.

By W. W. WEIR

Chilean Nitrate of Soda Educational Bureau

AMONG the many kinds of materials that are sold for fertilizer purposes, there is only one natural nitrate fertilizer. For more than 50 years this natural nitrogen fertilizer has been commonly known as nitrate of soda. For convenience, many farmers, particularly those in the cotton belt where this fertilizer is just as much a staple commodity as is sugar, have called it simply "soda."

The consistent record of success that farmers and fruit growers have achieved with natural nitrate over a long period of years has encouraged the manufacture of synthetic forms of nitrogen, including a pure chemical product which is also nitrate of soda. In order to distinguish clearly the natural product from the synthetic or manufactured product, the former will in this paper be referred to as Chilean nitrate or Chilean nitrate of soda.

There is only one place in the world where natural nitrate is produced. It comes from the desert nitrate plains of northern Chile, whence the name Chilean nitrate. It is reported at times that the supply of Chilean nitrate is nearly exhausted and that the substitute forms of nitrogen have appeared on the market just in time to take the place of the natural product, which for many years has been generally recognized as the standard nitrogen fertilizer. On the contrary, careful surveys and new developments have revealed that only a very small proportion of the nitrate beds in Chile have been worked, and that it can be confidently accepted that, allowing for normal increases in demand, there is enough natural nitrate to last the farmers and fruit growers of the world for several hundred years.

At the present time, the nitrate industry in Chile is in a transitional period. Production processes are being revised and improved in order to eliminate waste, to develop greater economic efficiency, and to supply a product of superior quality. It may be of interest to fruit growers, especially those who know the fertilizing value of natural nitrate, that confidence in the Chilean product as a profitable fertilizer is becoming more and more firmly established in all parts of the world. In the United States this confidence is reflected in the 50 per cent increase in consumption over that of the last fiscal year.

In his famous book entitled, "Soil Conditions and Plant Growth," Sir John Russell, director of the oldest experiment station in the world, at Rothamsted, England, says, "Of all the nitrogen compounds yet investigated, nitrates are the best, and, in natural conditions, probably the only nitrogenous food for non-leguminous plants."

In these brief words, Director Russell sums up the discoveries that scientists have made in their studies of the secrets of nature, regarding the feeding of plants. Fruit trees are non-leguminous plants, so that the form of nitrogen that nature has intended for them is exactly the same form of nitrogen as is contained in Chilean nitrate. The results of horticultural investigators in this country have confirmed the fact expressed by Director Russell, namely, that fruit trees absorb nitrogen largely in the form of nitrates. Thus, the natural demand of fruit trees is for nitrate nitrogen.

It is of interest to note that when a fruit tree is surrounded by artificial or unnatural conditions as regards its feeding, it will utilize nitrogen in forms other than nitrate nitrogen. Investigators have found that when a tree is fertilized with a nitrogen fertilizer that is not in the form of nitrate, the tree must depend upon outside forces, particularly soil organisms, to change that nitrogen into the nitrate form before it can be assimilated. The fact that Chilean nitrate is ready plant food, or that it can be immediately used by crops and trees, explains in a large measure why this fertilizer is so quick-acting, efficient, and dependable.

Yield of McIntosh Apples Greatly Increased by Fertilizing with Chilean Nitrate

To Left—31 trees, each receiving five pounds of Chilean nitrate, gave a total yield of 159 bushels.

To Right—31 trees, unfertilized, yielded only four bushels.

These are results for 1928 in the Wilson and Jones orchard at Hall, Ontario county, New York.

Superiority of Natural Nitrate as a Fertilizer

Although fruit growers, agronomists, and farmers have long recognized the high fertilizing efficiency of natural nitrate of soda, or Chilean nitrate, they have given little thought to the solution of the *(To Page 14)*

INCREASING APPLE PROFITS

This Grower Relates His Experience With the Use of Fertilizers in His Apple Orchard. His Figures Show That $10.80 Expended for Fertilizer Brought in $94.87 Additional Income—A Profit of $84.07.

By RICH LUCAS

A typical 25-year-old Jonathan in the Lucas Orchard.

THE RAMIFICATIONS of the root system of mature apple trees are large, both in area and in depth, but, due to an apple tree remaining in one location for years while it grows and matures a large framework, on which it must produce the fruit yields, it is only a few years until the root system draws out most of the available plant food within reach of the roots. I have learned, through experimenting on blocks of trees in our orchard, that, because of this, several distinctly unprofitable features develop.

First, the setting of fruit begins to decline and, while there may be a fair bloom, the trees appear to be in a devitalized condition so that many blooms fail to set. Of the fruits that do grow, many leave the trees during the June drop. This was one of my principal troubles. It was the direct curtailment of my monetary profit that first started me using commercial plant food.

Second, our trees as they commenced to suffer from malnutrition took on a sort of sickly yellowish appearance, losing their green color. There was also quite a noticeable curtailment of terminal growth. The trees which did not secure adequate plant food were unable to properly withstand our usual summer drought. They commenced dropping their foliage in the latter part of the summer just at the time when they should be growing at their best and should be forming fruit spurs for the following season's crop.

Third, trees securing inadequate nourishment were unable to grow and mature first grade fruit.

To secure some accurate information to enable us to feed our orchard most profitably, we marked off several sections of trees as near identical as possible, applying, except on one section which we kept for checking purposes, different plant foods or amounts thereof. We finally found that the use of ammonium sulphate alone gave us by far the best and most profitable returns. The use of superphosphate and sulphate of ammonia mixed gave us practically the same returns and results as where nitrogen alone was used but at a somewhat greater increase in cost for materials and application. The use of superphosphate alone gave us practically no benefits whatever, so for our condition and trees, I concluded that phosphoric acid is not sufficiently lacking in our orchard soil to make its usage pay.

The blocks of trees I have experimented on mostly have been mature Jonathans some 25 years old. About a month before average blooming is the period I have found best for applying the nitrogen, and on our last apple crop I applied what I have found to be the most profitable amount of sulphate of ammonia to apply—five pounds to the tree. Due to the fact that our orchard is set in sod, the grass uses nitrogen as well as the trees. Very few feeding rootlets are close to the trunks, so I do not place the plant food closer than some three or four feet from the trunks, broadcasting it in a large circle to well past the spread of limbs. I do not work the plant food into the soil but apply the material plenty early so the first rain will dissolve it. In solution, it quickly soaks in and is distributed through the soil.

Outside of the application of sulphate, our practices were identical to those of previous years, five sprayings being given. At harvest time for our information I had the sections picked and measured separately, which resulted in a check-up of 67.71 barrels per acre from the trees receiving the sulphate of ammonia, and 46.66 barrels per acre from the unfertilized trees, figuring 48 trees per acre, ours being set 30 feet both ways.

While the apples produced by the fertilized trees were better and larger, although of little difference in color, they were worth more per bushel as picked. However, they were sorted and put into bins before I could secure the desired tabulations on the proratio of firsts to culls, so I figured all our apples at the same price, $4.50 per barrel, which was the amount our Jonathans sold for. The apples from the check section, which received no plant food, brought us $209.97 per acre, while the fertilized trees returned $304.70 at a cost of $10.80 per acre for fertilizer.

The illustration shows an average tree which received the spring application of sulphate. It portrays exactly the healthy, vigorous condition of the trees and set of fruit, as well as the luxuriant growth of grass within the fertilized circles.

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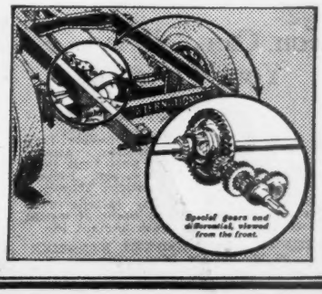

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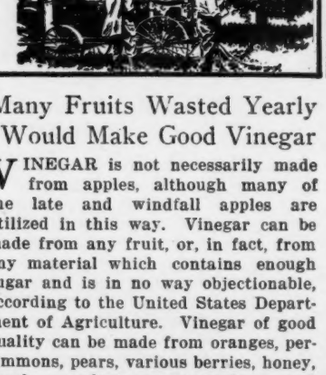

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AMERICAN FRUIT GROWER MAGAZINE
53 W. Jackson Blvd., Chicago.

Many Fruits Wasted Yearly Would Make Good Vinegar

VINEGAR is not necessarily made from apples, although many of the late and windfall apples are utilized in this way. Vinegar can be made from any fruit, or, in fact, from any material which contains enough sugar and is in no way objectionable, according to the United States Department of Agriculture. Vinegar of good quality can be made from oranges, persimmons, pears, various berries, honey, maple products, watermelon, and grains. Large quantities of some of the fruits mentioned are wasted each year in the United States.

Directions for making any of the above-named fruit and other vinegars will be furnished by the United States Department of Agriculture.

The Market Review

By PAUL FROEHLICH
United States Bureau of Agricultural Economics

COURAGE, training and experience are necessary to make a success of fruit growing over a long period of years, according to an opinion voiced by a leading pomologist in California. This specialist said that the trend of fruit prices in recent years might lead a casual observer to the conclusion that the fruit business is sadly overdone. However, he added, this may or may not be the case, depending upon the view point as to whether the relatively low prices are due to overproduction or under-consumption. The individual grower must continue to farm his land, nevertheless, and there are many who still believe that fruit growing, in California particularly, offers opportunities for men with the requisite courage, training and experience. This is an inspiring message to orchardists and vineyardists everywhere, especially since it comes from California, the premier fruit state.

Changes in Shipments

With apples harvested and stored away; with grapes nearing the end of their season, and with pear output now limited, carlot movement of these fruits was rapidly decreasing. Oranges and grapefruit, on the other hand, were coming in heavier volume each week, particularly from Florida. California lemons were showing their usual winter dullness. All fruits except oranges were moving more actively during November than they did a year ago, because of heavier production this season. Combined forwardings of the leading fruits and vegetables were averaging 31,000 cars weekly, or just about the same as last autumn.

Apples Tending Upward

Considerable poor quality fruit has had to be culled out of the apple crops in some eastern and northern states, and the supply of good winter varieties is not very large. The merchantable crop in New England is especially light. By-products factories have been busy. Farther west, there seems to be an abundance of fruit. Carlot movement from Washington and Virginia combined has been unusually heavy—32,700 cars by November 3, compared with 19,300 the year before and about 32,500 cars two seasons ago when apple production broke all recent records. Now that shipments directly from orchards are finished and current movement is from either common storage or cold storage, the market has been stabilized and price advances are looked for in many quarters. In fact, an upward trend was already noticed during early November.

Average farm price on October 15 was 99 cents per bushel, as against $1.35 at the same time in 1927 and 80 cents in 1926. Usually the general average of farm prices of apples for the country as a whole advances from about September-October to the end of the season, the advance being considerable in some years and only moderate in others. This year's total supply is approximately equal to the 172,000,000 bushels of 1924 and 1925. In 1924 prices advanced about 50 per cent between September and May, but in 1925 the advance was only about 25 per cent. The smaller seasonal rise in the farm price in 1925 was associated with a greater movement into cold storage, induced probably by the profitable experience of 1924. For the western states, the present season's production forecast shows a crop about as large as the record crops of 1923 and 1926. Consequently, f. o. b. prices in the Northwest are close to the levels that prevailed at corresponding dates in those years. The relatively small crop of eastern varieties indicates that prices of these varieties will not be as far below last year's prices as will those of the western apples.

Crop Figures Increased

The November estimate raised the report of total apple production by 5,750,000 bushels to a total of 183,300,000, compared with 123,000,000 last season, and a five-year average of approximately 200,000,000 bushels. The estimate of the commercial crop in Michigan was slightly reduced by November, but considerable increases were noted in New York, West Virginia, Washington and Oregon. A net gain of 958,000 barrels has raised the commercial crop to 34,441,000 barrels, as against 26,000,000 last year. Commercial production in Washington is 10,336,000 barrels, and exceeds all recent records. General quality of the apple crop is about 75 per cent, or four points below the 10-year average.

City Prices Advancing

Bushel baskets of several important eastern varieties strengthened considerably during the month. Advances of 10c-25c resulted in a general jobbing range of $1.25-1.65 by early November, with eastern Delicious apples bringing $1.75-$2, and McIntosh as high as $3.25. New York City quoted best New York Wealthys at $4-$5 per barrel, Baldwins at $5, Greenings at $5-$5.50 and McIntosh at $9-$11. General range in Chicago was $4-$6.50. Most varieties in barrels were jobbing $1-$2 below last season's corresponding quotations, with bushel prices in proportion. Bushel baskets of combination-grade Jonathans from Idaho sold in Chicago at $1.65-$1.85, while boxed Jonathans from Washington brought $2.25-$2.35 and Delicious $3-$3.25. The Washington apples were Extra Fancy grade. F. o. b. range in the Pacific Northwest was $1.25-$2.15 per box, according to variety. Shipping points in western Michigan reported most sales of barreled fruit at $4-$5.50, compared with best Baldwins in western New York at $4.65 and Greenings at $5. A year ago, shippers got $5.50 on New York Baldwins. Last quotations from the Potomac-Shenandoah Valley area indicated an f. o. b. range of $3.50-$4. Movement was extremely heavy from that region, much of the fruit going to export markets.

Storage Holdings Heavy

On November 1, commercial cold-storage plants in the United States reported 2,871,000 barrels, 12,421,000 boxes, and 4,918,000 bushel baskets of apples under refrigeration. Combined holdings were 44 per cent heavier than a year ago and 30 per cent above the five-year average for November 1. The supply of barreled apples was about 11 per cent below average but was 54 per cent greater than last season. Boxes were 37 per cent more abundant than in November, 1927, and were 50 per cent above the average figure for this time of the year. Approximately three-fourths of the boxed apples in cold storage were still in Pa-

cific Coast states. Holdings in bushel baskets exceeded the corresponding figure for last season by 49 per cent and were 148 per cent above the five-year average. The proportion of the commercial crop being held in cold storage this year indicates not only an increase of storage space but also a general confidence in the future market for apples.

British Markets for Apples

After the excessive receipts and lower prices of October, American apples began to steady themselves in Liverpool and London, and fairly satisfactory sales were being reported in early November. Supplies of boxed apples were in excess of the demand. Though Virginia York Imperials were in heavy supply, the demand for that variety had improved in Liverpool and a range of $5.10-$5.35 per barrel was reported on 2½-inch stock, U. S. No. 1 grade. Some exceptionally well-colored Yorks brought nearly $6. Extra Fancy boxed apples showed a wide range of $1.95-$2.90, according to size and variety. Prices in Hamburg, Germany, were somewhat higher than those in England, some quotations ranging up to $7.30 per barrel.

Quality and condition of barreled apples arriving in European markets this season excelled the early fruit in any of the last four years. There was exceptionally little depreciation from heat. Some varieties arrived with almost the same freshness as cold storage stock, later in the season. California Gravensteins had a satisfactory season, because exports were made in rather moderate quantities, the fruit was in very good condition on arrival, and no extremely small sizes were shipped abroad. The foreign market outlook for American apples continued encouraging, both in Britain and on the continent. Russian fruit is likely to offer increased competition this season, particularly in Sweden and Germany. The bulk of the European apple crop was expected to be moved by the middle of November.

Short Cranberry Crop

Preliminary estimates, subject to revision, indicate a total cranberry crop this year of 525,000 barrels, against 495,000 harvested in 1927. Massachusetts expects about 325,000 barrels, compared with 370,000 last year; New Jersey 135,000, against 75,000; Wisconsin about 45,000, against 24,000; and Washington and Oregon a total of not over 20,000 barrels, compared with 26,000 in 1927. The United States crop of 1926 was estimated at 743,600 barrels, and that of 1925 at 591,000 barrels. The estimated production of 525,000 barrels is about 55,000 more than the total as figured by a leading co-operative organization. Most of the difference is in the report for Massachusetts.

In view of the relatively light supplies available, demand for the Thanksgiving and Christmas trade was expected to be quite active. Dealers in New York City were quoting half-barrel boxes from Massachusetts and New Jersey at $5-7.25, with a few fancy packs higher. Boxes holding one-quarter of a barrel were jobbing at $3.25-$4.

Florida Citrus Active

The Florida citrus season was developing rapidly during November. Compared with 135 cars the last week of October, orange shipments jumped to 680 cars the following week, or twice as many as during the same period in 1927. New-crop oranges in California also were moving. The season total to date, for both Florida oranges and grapefruit, is running considerably ahead of last season's corresponding record, because of heavier production.

In the forepart of November, the Washington, D. C., wholesale market quoted boxes of Florida seedling oranges, medium size, at $4.75-$5. Navel oranges sold at $6-$6.50. No. 1, medium to large, Florida grapefruit brought $3.75-$4.25, with No. 2 fruit at $3.25 per box. Best California lemons were reported in Washington at $6.50-$7. The Liverpool, England, auction quoted Florida grapefruit around $7, with a few sales higher.

Grapes About Finished

In spite of efforts to restrict shipments of California grapes to 65,000 cars this season, the total probably will reach 70,000, and may exceed that figure. Markets were not very favorable this year, and, in general, it was an unprofitable season for California growers and shippers. Better success was had in the East. Prices on New York grapes were fairly satisfactory and advanced considerably before the season closed. Total 1928 shipments of this fruit were expected to be at least 80,000 cars, as against 82,570 last year. The deficiency was chiefly in central and southern California and in Michigan.

The November crop report on grapes showed a total of 2,631,000 tons, or 26,000 more than were estimated in October. The figures for Pennsylvania and Ohio were slightly increased, but crops in New York and Michigan were lighter than at first expected. About 27,200 tons were added to the California estimate during October, making the total for that state 2,326,800 tons, compared with production of 2,406,000 in 1927 and a five-year average of 1,859,400 tons.

American Prunes in France

In view of the needs of the French market for increased quantities of imported prunes this year, because of the shortage in the French crop, the local demand for American dried prunes has been very active. Important consignments of 1927 crop California prunes arrived during the summer and some very satisfactory orders were given for American prunes of the 1928 crop. Some of this new stock came by a direct steamer from San Francisco which left there at the end of September and arrived at Bordeaux early in November. It was reported that sufficient cargo might be found for another direct sailing from the Pacific Coast during October. While these cargoes include other goods besides prunes, the latter make up an important part of the consignments on the direct steamers. Pacific Coast dried fruits are also received by transhipment at Havre, and small quantities come in directly from New York.

From January to September inclusive, about 4,880,000 pounds of prunes had arrived at Bordeaux from the United States—an increase of 1,650,000 pounds over the corresponding period in 1927. The higher French duty on foreign prunes has not been great enough to prevent an increase of business this year. The Hamburg spot market for dried prunes was active and firm at the opening of November. London also reported an active market. Germany received fully twice as many prunes from the United States during the past season as during the 1926-27 season, the total from America being 57,364,000 pounds. The California crop of dried prunes this year is estimated at 370,000,000 pounds, compared with 406,000,000 last year.

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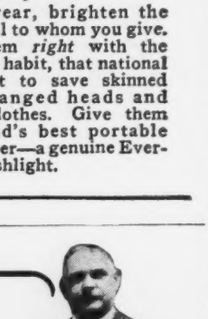

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Enclosed is $5.00 (money order or check) for delivery of the Christmas Box to:—

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CHATS with the Fruit Grower's Wife

By HAZEL BURSELL

ROAST GOOSE is the traditional piece de resistance for the Christmas dinner, and it always seems that if goose is served instead of turkey the feast takes on an individuality all its own, for it then has quite a different character from the Thanksgiving repast.

But first, before proceeding with instructions for garnishing and serving, it may be well to offer a few practical suggestions for the roasting of the goose. To begin with, the goose will indeed be a "piece de resistance," with the accent on the resistance, if an attempt is made to roast an old goose. The proverbial boiled owl hasn't anything on roast aged goose for toughness. Therefore, be sure to select a young or "green" goose. Then, since a goose is very fat, the bird is best when placed on a rack stretched across the dripping pan for the roasting. In this way the fat has plenty of room to drip and the goose itself does not have to sizzle in it. Another way to improve the flavor of the finished product is to stuff the goose with raw, pared and quartered tart apples in place of the usual bread stuffing. The tart fruit imparts a delicate, tantalizing flavor to the goose, and the resultant fruit stuffing makes a delightful accompaniment for the roast. The goose should be browned to a turn.

Use Large Platter

For serving the goose, or any other large bird, select a very large platter, so that there will be plenty of space for the garnishings without their proving an embarrassment to the carver. Lay the bird on the center of the platter and arrange the garnish around it. Remember that neatness, system and color contrast are the essentials for success in garnishing.

You may incorporate the holiday colors in the garnish by using the following plan: Pare and core a dozen small apples; prepare a syrup made by boiling three cupfuls of sugar with two cupfuls of water until fairly thick and tinting it rather vividly with red vegetable coloring. Cook the apples in this syrup until tender, but not broken, turning them so that they will be evenly tinted. Remove to a shallow buttered pan, stuff with a mixture of chopped cooked prunes and nut meats, sprinkle with granulated sugar and glaze delicately under a broiler flame or, lacking that, use the upper grate in a very hot oven. Start the apples in time so that they will be cooked when the goose is ready for serving.

Next arrange the apples around the goose at intervals, and place a fan-like fringe of white celery behind each apple to offer color contrast. To prepare the celery fringe, cut pieces two and one-half inches long from wide celery stalks, and split one end of each piece into narrow slips, taking care to leave an inch at the other end of the piece intact. Spread the "fringe" carefully into a fan-like arrangement. Between the apples place generous sprigs of crisp, curly parsley. Such an arrangement makes a simple, but most effective, garnish.

Another successful garnish consists of crisp watercress with large, bright red cranberries. If the apple stuffing was not used in roasting, then the goose should be served with apple sauce. The simplest garnish would be a generous display of crisp, green parsley—that and nothing more. However, the hostess will find that the touch of color added by the prepared apples or cranberries adds greatly to the festivity of the meal at small outlay of time and effort.

Sharp Carving Knife Essential

The first requisite for success in carving is a sharp knife. For a goose weighing about 10 pounds as purchased (which is large enough to serve six persons generously), select only a six and one-half inch carving knife if you would accomplish the carving in the easiest and most efficient manner. In carving a goose there is no slicing as on the breast of a turkey or a roast of beef, so that the shorter knife offers more stability for the type of cutting to be done. A sharpening steel is always excellent for putting a fine cutting edge on the knife and should find its way to the table, together with the other carving tools.

Begin the carving of the Christmas goose by inserting the fork firmly in the breast. Then, grasping the fork in the left hand, cut through the skin with the tip of the knife where the wing joins the body. Push the wing back with the broad side of the knife blade and cut through the exposed joint, thus severing the wing from the body of the goose. Without withdrawing the fork, sever the leg and thigh parts in a single piece in a similar way. Cut through the skin where the thigh joins the body and, using the flat side of the knife blade as before, bend back the leg and thigh piece so as to expose the joint; then cut through this joint, using the tip of the knife. Lay aside the wing and leg pieces while carving the breast.

Remove Breast Carefully

The very easiest and most satisfactory way to carve the breast of either a goose or a duck is to remove each side of this most delicate portion all in one piece. To do this, cut along the ridge of the breast bone the entire length and then, slipping the knife carefully under, cut close to the body of the bird so that not a bit of the delicious meat is left on the bones.

Up to this point it has not been necessary to remove the fork from its original position in the breast of the goose. Now, however, it may be removed to assist in carving the breast portion into serving pieces of suitable size. Four or five such portions may be cut from each side of the breast of a 10-pound goose by making the cuts crosswise of the meat fibers.

Divide Leg Portion

Next divide the leg-and-thigh section into two serving pieces by cutting through the joint between them. The wing may also be divided, though carvers do not usually do so as there is not much meat on this portion. The carver may now start the serving, selecting a piece of the breast together with one of the bony portions for each serving. Then he may proceed to carve the other side of the goose, following the same procedure.

The traditional carving of the Christmas goose can only attain its true state of ceremonious dignity, thus providing the full measure of anticipatory pleasure to guests and host alike, when the carver has sufficient skill and knowledge of proper carving methods to enable him to perform with deftness and sureness. And remember, ye good cooks, that no amount of mere carving skill can make the carving of a tough, old goose into the aforementioned ceremony of dignity and pleasure! The cook and the carver must co-operate and each do his or her part skilfully and well.

Wrap Gifts Attractively

ATTRACTIVE wrappings for gifts are essential if the utmost enjoyment is to be derived by the receiver. This is true of gifts for any occasion, but is especially true of Christmas gifts. We know from experience that the same article gives twice as much pleasure when presented in pretty wrappings as when uninterestingly wrapped. And, since the giving of pleasure is the real object of all gift giving, no one can afford to overlook this simple means of giving added pleasure.

Interesting wrappings suggest something interesting inside the package—they intrigue the imagination—with the result that the receiver of the gift enjoys the thrills of anticipation in full measure. Wrappings need not always be merely "pretty," for some gifts are more interesting when wrapped in some especially funny, clever or original manner.

Place Gifts in a Box

Usually it is wise to place the gift in a box of suitable size and shape, as this makes neat wrapping easier and at the same time disguises the shape of the article within. The box may be ornamental in itself so that it needs no additional wrappings, or it may be plain to serve as a foundation for interesting coverings. Containers may be gayly painted tins with lids or pretty baskets or wooden chests in addition to the conventional pasteboard boxes. Many gifts come in suitable boxes direct from the stores. In fact, most large department stores will wrap and trim all gifts purchased there free of charge. Where boxes or other containers are not available, they may be purchased at stationery stores or the 10-cent stores.

Some suggestions for the wrappings include the following: white tissue paper with holly or bright red ribbon ties or with gay colored binding of gummed tape in red, green, gold or figures; red tissue paper with a binding of gold or holly gummed tape or with ties of gold string; brocaded "metallized" paper in various colors with ribbon or string ties; holly paper with silver or gold string ties or with narrow red ribbon ties.

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Please send me your plan and catalog.

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Fruit Farm Poultry

By RALSTON R. HANNAS

Vitality for Breeding Hens

IT IS NOT a matter of feeding and caring for the breeding hens just to get eggs for the table. If it were, hens from now on could be handled differently. To be sure, some of the eggs laid by these hens may find their way to the table or to market as table eggs, but the purpose of these eggs is to produce chicks at the proper time.

Flock owners often forget that it is the job of these hens to put *life* into their eggs and that their own job is to give the hens a good chance to do this. The hen must not only put a yolk and white, or albumen, into the egg and encase it in a good firm shell, but she must also put a live germ there that will later, when exposed to the proper degree of heat, develop and make use of the food material that is in the egg, and finally burst forth into a full fledged chick. This is not the end, either, for the chick must battle his way along and grow to maturity, and he must have strength to do this.

And while the hen is putting all this into the egg, she must maintain her own body, for if she fails in this, the germs of her eggs will weaken, and chicks will fail to hatch; or if they do hatch, they will be weak and mortality will follow. Or the hen may cease to lay eggs altogether.

Aside from a good ration that is ordinarily fed to such breeders, the use of cod liver oil from now right on through the breeding season is one of the best ways to help the hen in her task of producing good eggs and strong, healthy chicks. It will help keep the hens in good condition, will help to prevent egg paralysis which sometimes occurs during the winter, will help to produce eggs with stronger shells, and will help to increase the hatchability of the eggs that are produced. The better the condition that hens can be kept in, the less chance there is for infection from disease. The usual amount of cod liver oil that is added to the ration is two pounds for every 100 pounds of the mash fed, or one pint for every 100 pounds of mash.

Sore Eyes or Roup

AT THIS time of the year, birds are apt to have watery eyes, which would indicate that colds are present in the flock. If allowed to go on, these colds are apt to develop into the disease known as roup. This disease is easily recognized by the badly swollen eyes with a discharge of mucus matter. The birds will also stand hunched up and will have a decidedly sick appearance.

If birds can be kept warm, they can be cured more quickly than if they are allowed to remain in a cold house. First, see that there are no drafts in the house and that the house is made as comfortable as possible. Next, remove all sick birds and keep them away from the well birds in a warm room or building. Treat their eyes with a good disinfectant or a good roup remedy, swabbing out all the slimy matter in the eyes and nostrils. Also squeeze out all of this matter that can be gotten out of the swellings around the eyes. Put some good disinfectant in the drinking water to prevent the spread of the disease, as the drinking pan is the place where all birds in the flock—sick and well—congregate. A dose of Epsom salts to the entire flock will also help to clear up the difficulty. The salts are given at the rate of one pound per 100 birds for one day only. It may be repeated in about a week if needed. It is given in the drinking water.

How to Mix Cod Liver Oil in the Feed

IT IS NOT easy to mix cod liver oil into the feed in bulk because it clods up and a good mix is not obtained. The easiest way to do this is to mix the oil in a small quantity of feed, that is, as much feed as will nicely take up all the oil, and then mix this small batch of feed that has been mixed with the oil with the remainder of the feed to be mixed.

Some poultry keepers mix the oil with the grain instead of with the mash. This is all right, in fact, it is easier to mix it in this way. The disadvantage of this is that the grain is most always fed in the litter. This being the case, as the grain will be greasy from the oil, there is the possibility of the grain getting dirty from the dirt in the litter—since it is easy for the dirt to cling to the greasy grains. If grain is fed in hoppers or troughs, this objection does not hold.

If it is the practice to feed germinated oats, the oil may be mixed with these. In this case, the oil is mixed with enough bran to absorb the oil nicely, and this in turn is mixed with the oats.

Are All the Lights Working?

WHEN electric lights are being used in the laying house to increase egg production, it is a good plan to test the lights at least once a week, particularly if the system of lighting is such that it is inconvenient for the poultry attendant to be in the laying house when the lights are on, as in the very early morning. If the attendant is present when the lights go on—many men like to feed the birds themselves—it is not necessary to test them, for he can see whether or not they work properly.

Lights may be turned on during the day for a few minutes, if desired, to make sure they are all right. If the flock owner relies upon a time switch to turn the lights on and off, he has no way of knowing whether the bulbs have burned out or not unless he goes to the house himself or tests them during the day. Bulbs that have burned out may then be replaced.

Should the bulbs fail to light for several nights or mornings, the usual course of things will be changed and the birds will likely be thrown into a moult. A decrease in production will result. This is why it is important to make sure the lights are working properly.

A Perch in the Sun

A MASSACHUSETTS poultryman I know of believes in encouraging his birds to bask in the ultra-violet rays of the sun in the winter to their hearts' content. He has a three-story barn that has been made into a chicken house, and on the top floor he has cut dormer windows that are covered with glass substitute.

All along the front of the pen he has a perch about two feet off the floor so that the birds may perch there and bask in the sun. The hens like it, for it is certainly a popular place on sunny winter days.

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Two years of investigation have disclosed the most amazing facts about spray coverage. Our new booklet, "The Truth About Spraying Costs", will give you these facts and show you how you can apply Scalecide in half the time required to spray with either oil emulsion or lime-sulfur. Write for this booklet today.

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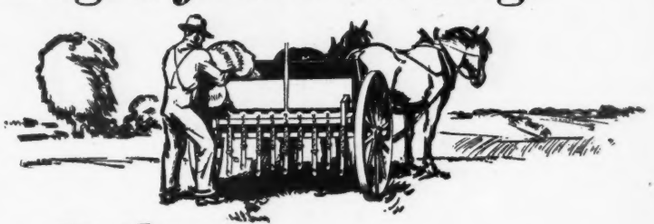

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Buyers' Service Bureau

For the convenience of our readers we list below some lines of fruit farm equipment and home conveniences. If you are considering the purchase of any of these items we will be glad to forward your request for information to responsible manufacturers. From them you will receive full information as to prices, etc.

FOR THE HARVEST
- ☐ Ladders ☐ Fruit Pickers
- ☐ Picking Sacks
- ☐ Orchard Pick-up Wagons
- ☐ Berry Crates and Fillers
- ☐ Box and Shook Stock
- ☐ Bushel Baskets
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- ☐ Package Labels
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- ☐ Stencils
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Check the items upon which you wish information. (No cost. No obligation except to give serious consideration.) Send it TODAY to

Buyers' Service Bureau, American Fruit Grower Magazine,
53 W. Jackson Boulevard, Chicago, Ill.

Gentlemen: I am interested in the subjects checked above.

Name .....

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Fruit Farm Engineering

By E. W. LEHMANN

Two Kinds of Farm Drainage

THERE are two kinds of drainage of interest to the farmer; first, the control of water on slopes to prevent soil washing, and second, the removal of excess water on areas that are now unproductive due to too much water being present. The former drainage problem is one that can be found on many fruit farms, because the fruit grower is prone to select a well-drained, sloping area and often the well-drained area may prove to be an area that is liable to damage by soil washing.

Every fruit grower who is going to plant an orchard on sloping land should take steps to get the land terraced before planting, so as to avoid the damage which is bound to occur if this is neglected. Terracing is simply one kind of drainage. It is the kind which prevents the accumulation of water in streams that flow directly down the slopes. Instead, the water accumulates between the terraces, and it is then allowed to flow across the slope at a slight velocity, and soil washing is prevented. Much assistance in preventing soil washing may be obtained from state agricultural colleges and federal departments of agriculture. Soil washing is now being generally recognized as one of the greatest problems of the farmer.

Dr. H. H. Bennett of the Federal Bureau of Chemistry and Soils recently made a tour of inspection to study the soil erosion problems of some of the middle western states. Relative to some of the conditions found, he has the following to say:

"Within four years one farm valued at $15,000 has been practically destroyed by a gully that ranges to 60 feet in depth and nearly a mile in length. This gully has branched out over the valley and cut to pieces the fine lands that formerly occupied it. It cannot be stopped now—not by a single farmer. The task is entirely too great. What land is left is being used very largely for corn, and this soil is going at a very rapid rate. In one field recent rains cut gullies more than two feet deep. The yield of corn will scarcely pay for the harvesting."

Referring to sheet erosion as a more extensive thief of agricultural land than gullies, this soil specialist says its ravages are by no means confined to fertile loessial soils like those of Iowa, Nebraska, Kansas and Missouri, but affect the glacial soils and those derived from shale, sandstone and limestone in Indiana, Illinois, Ohio and Wisconsin. The process of disastrous sheet erosion in the Middle West is described by Inspector Bennett as follows:

"In Wisconsin on a slope that has been in continuous use for about a generation the depth of soil down to disintegrated sandstone ranged from four to 11 inches, and this soil was all poor subsoil material producing about one-fifth of a ton of timothy to the acre, with some bare spots. On the slope facing this, just cleared and not yet plowed, there was a deep layer of splendid silt loam, overlying silty clay loam. Here the depth to rotten rock, the basal material, ranged from 14 inches to more than three feet."

To prevent the sheet erosion of soils, Inspector Bennett agrees with other federal and state soil specialists in urging the planting of hays and other cover crops in a rotation which will not leave the farm lands so constantly exposed as by constant cropping to corn and other crops which invite erosion. As a means of preventing the spread of gullies, Mr. Bennett says, the farmers are finding that the planting of willows, from the lower part of the gully and as far above as possible, is proving effective in many places. He states that the use of terracing, which has proved an effective protection against the erosion of southern farm lands, is gaining favor and proving effective with northern farmers in their struggle against erosion.

Terracing is a job that should not be delayed if you have sloping land that is wasting away. Call on your county agricultural agent for assistance, or write to your state college for information on the subject. Get ready to do the job before the next spring rains take their toll of your best surface soil.

The Second Kind of Farm Drainage

Drainage by means of tile to remove excess water from certain spots on the farm should be of interest because such drainage increases crop yields and permits the use of the most modern machinery where open ditches do not.

Lack of adequate drainage is always noticeable after a rainy season. Quite often a few hundred feet of tile will rid the farm of a wet spot which has been an aggravation for years. Fertile land of little value is made productive, and the efficiency of operation is improved by proper tile drainage.

Getting Electric Service to Farms

IT IS generally understood that if electric service to farms is put on a sound basis it must pay its way, both to the farmer who uses it and to the power company that supplies the service. At a recent farmers' meeting where the subject of farm electrification was discussed, it was pointed out that electric service for farmers must be supplied on a basis that encourages use and that brings in sufficient income to justify the investment required to provide the service. And yet, at this meeting, a farm woman appeared very indignant because she could not get electric service on her farm at a cost of 75 cents a month, which was the monthly minimum in the local town.

On inquiry it was found that the rate in this town was 15 cents a kilowatt hour, a rate that was developed on the basis of low consumption. For 75 cents the consumer could use five kilowatt hours. The average home with electric service uses about five or six times this amount for lights and minor appliances. However, this woman wanted the power company to supply electric service to her farm home for 75 cents a month, an amount that is hardly sufficient to pay for the losses in the transformer.

Even though the farmer pays for the distribution line and donates it to the power company, the company must pay the taxes, maintain the line, set aside an amount for depreciation and assume all risks. In addition, the company must maintain adequate plant capacity to supply the service demanded. These costs amount to at

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JNO. C. GOSSLER, Mgr. Dir.

Statement of the Ownership, Management, Circulation, Etc., Required by the Act of Congress of August 24, 1912,

of American Fruit Grower Magazine, published monthly at Chicago, for Oct. 1, 1928.

State of Illinois, County of Cook, ss.—Before me, a notary public in and for the state and county aforesaid, personally appeared Harry W. Walker, who, having been duly sworn according to law, deposes and says that he is the business manager of the American Fruit Grower Magazine, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor and business manager are:

Publisher—Magazines, Inc., 53 W. Jackson Blvd., Chicago, Ill.

Editor—Harry W. Walker.

Managing Editor—None.

Business Manager—Harry W. Walker, 53 W. Jackson Blvd., Chicago, Ill.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)—C. A. Tupper, H. M. Sisley, H. W. Walker, J. E. Montgomery (all at 53 W. Jackson Blvd., Chicago, Ill.); C. W. Price, 250 Park Ave., New York City; E. G. K. Meister, 940 Engineers' Bank Bldg., Cleveland, Ohio.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) —None.

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HARRY W. WALKER,
Business Manager.

Sworn to and subscribed before me this 13th day of October, 1928.

(Seal) A. C. BAMBERGER,
Notary Public.
(My commission expires Aug. 11, 1929.)

least 10 per cent of the amount invested. An average investment for each farm, where there are three farms to each mile of line, is about $500. The cost, not considering interest, would be $50 a year, or $4.16 a month. If the company pays for the line and we add interest at six per cent, the cost is increased $30 a year, or $2.50 a month, or a total of $6.66. This is the monthly cost to be ready to serve, whether any electric energy is used or not. If this amount was paid the power company as a service charge, electric energy could then be supplied at a low rate. Some power companies have a service charge to cover these costs. However, the same thing is accomplished by including a reasonably large quantity of electric energy in the monthly minimum. A plan was worked out on this basis which allows 135 kilowatt hours service with a guaranteed monthly minimum of $10, all additional energy to cost three cents a kilowatt hour. This plan has been adopted by four of the district power companies in Illinois, serving approximately 70 per cent of the farming area of the state.

Under this plan, any one of the companies will invest on an average up to $450 for each customer where there are a group of customers getting electric service. Under average conditions, when there are three farms to the mile, this plan will make electric service available to the farmer without any investment on his part. This plan will supply electric service to the farm on a basis which will result in economical power for farm use and will bring sufficient income to the power companies to justify the extension of lines at the power companies' expense.

Taking Nitrogen from the Air

(From Page 5)

the trade is called Diammonphos. This fertilizer material is commercially pure phosphoric acid combined with ammonia. It is very concentrated, also dry and crystalline in character. Diammonphos contains 21 per cent nitrogen and 53 per cent phosphoric acid, all of which is available.

Complete Chemical Fertilizer

To many people the most interesting development of air-nitrogen fertilizers that has occurred is the introduction of Nitrophoska, a complete fertilizer containing nitrogen, phosphoric acid and potash. In Nitrophoska only the nitrogen comes from the air. Obviously the phosphorus and potassium cannot be taken from the air, as they do not exist in the air. In producing Nitrophoska, ammonia is combined with nitrate and with phosphoric acid. These compounds while in solution are united with potash. After evaporation, a product that is granular in appearance is obtained, but very concentrated so far as fertilizer elements are concerned, because the non-essentials have been left out. The most common grade of Nitrophoska contains 15 per cent nitrogen, 30 per cent available phosphoric acid, and 15 per cent potash. There are, however, on the market other grades of Nitrophoska, containing as low as 11 per cent phosphoric acid and as high as 26.5 per cent potash. The range of nitrogen content in these Nitrophoskas is from 15 to 16.5 per cent.

Nitrophoska furnishes the farmer the largest amount of plant food in the least weight and bulk possible at the present time. It contains three to four times as much plant food as the usual grades of complete fertilizer, and this has often raised the question about safety in using it. Carrying more plant food per pound, a smaller quantity of Nitrophoska is required per acre, or for each plant, than when a less concentrated fertilizer is used. Field results show that if Nitrophoska is properly applied, the same as all fertilizers should be, it gives excellent results with no danger of injury either to germination or growth.

Summary of Essentials

If one is interested in remembering some of the important details about making air-nitrogen, the following are the essential facts:

1. Nitrogen and hydrogen are combined to form ammonia. These elements are secured from air and water, and combined under heat and pressure in the presence of the proper metal alloys, known as catalysts.

2. After ammonia is formed, it can be united with other materials or changed to nitrate, or into urea, depending upon the method used.

3. Coal is another important raw material to furnish carbon for some compounds and to supply the necessary heat and energy.

4. In making air-nitrogen fertilizer, simple chemical laws are followed: Thus, an alkali like ammonia will combine with an acid, like sulphuric, or phosphoric, or nitric, to produce salts suitable for fertilizer use. Calcium, potassium, and ammonium are all bases, or alkalis. They will neutralize or combine with acids to produce various fertilizer salts. Compounds can be combined so that two forms of nitrogen are present in one material, as for instance in Leunasalpeter and Calurea.

5. Air-nitrogen when combined with other elements for fertilizer purposes is just as stable as other similar forms of nitrogen. Nitrates made synthetically are equal to those from natural sources. Ammonia forms of nitrogen are similar whether produced from coal or air-nitrogen. Synthetic urea, an organic form of nitrogen, is chemically identical with urea in liquid manure.

Bulletin on Apple Scald

APPLE SCALD, one of the most serious diseases with which the apple industry must contend, can be largely controlled or reduced if growers, dealers and storage companies will make use of available knowledge on control and apply measures now known to be effective. Such information is published in Farmers' Bulletin 1380-F, "Apply Scald and Its Control," by Dr. Charles Brooks of the Bureau of Plant Industry, just issued by the United States Department of Agriculture. Copies of the bulletin may be obtained by writing to Washington, D. C.

An English One on Lawyers

Farmer—"An' 'ow be Lawyer Barnes doin', Doctor?"

Doctor—"Poor fellow, he's lying at death's door."

Farmer—"There's grit for 'ee—at death's door an' still lyin'!"

Girl (in South)—"I love the way boys talk down here."

Girl Friend—"Yes, it must be that Mason and Dixon 'line' you hear so much about."

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FRUIT GROWING IN THE OZARK REGION of Southern Missouri and Northern Arkansas has a big advantage in having soil and climate ideally adapted to fruit and berry culture. The gentle slopes of the Ozarks with their fine grained clay soil, abundant rainfall, mild winters, early springs, make the Ozarks ideal for the fruit grower. The nearby cities of St. Louis, Kansas City and Memphis provide great markets. The healthful climate, pure mountain spring water, the fine spirit of co-operation, prosperous and growing communities, good schools and hard surfaced roads make a delightful homeland. Land can still be bought at reasonable prices that will insure good profits on grapes, strawberries, apples, small fruits and vegetables. Write for more facts. C. B. Michelson, Frisco Railway, 860 Frisco Bldg., St. Louis, Mo.

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BIG PAY—SOUTH AMERICAN WORK, American firms pay fare, expenses. South American Service Bureau, 14,000 Alma, Detroit, Mich.

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RABBITS WON'T GNAW YOUNG FRUIT TREES for 1 year. Send $1.00 for guaranteed formula. Inexpensive ingredients. Wm. Goddard, Johnston City, Illinois.

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MOTORCYCLE BARGAINS—USED, REBUILT. Guaranteed. Shipped on approval. Terms. Catalog free. Clymer, Denver, Colo.

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PEACH AND APPLE TREES, $5.00; $7.50 PER 100 and up. Complete assortment fruits, berries, vines, ornamental trees, vines, shrubs, evergreens. Catalog in colors free. Tennessee Nursery Company, Box 101, Cleveland, Tenn.

APPLE AND PEACH TREES, 5C AND UP; grapevines, 3c; best varieties. Catalog free of fruits, berries and ornamentals. Benton County Nursery, Box 500, Rogers, Ark.

100,000 DUNLAP AND AROMA STRAWBERRY plants. Also full line of nursery stock. Schroeder Nursery, Farina, Ill.

PLANTS

PEACH AND APPLE TREES, $5.00 PER 100 and up. Fruits, ornamental trees, vines. Tennessee Nursery Co., Box 201, Cleveland, Tenn.

NATURAL NITRATES in FRUIT GROWING

(From page 6)

problem as to why or how its use results in such profitable increases in yields. The appearance of substitute forms of nitrogen and preliminary tests made with them seem to have brought this question more to the attention of soil and crop specialists and investigators.

It is believed by many that the natural nitrates have certain properties not possessed by the artificial products. It may be a question of a natural plant food versus an artificial fertilizing material. It is important to know all the facts about both the natural nitrate and the substitute forms; but as scientific research is a slow process because of its exacting methods, the truth will probably not be known for several years. In the meantime, however, we should avail ourselves of the information that scientists have discovered in studying the ways of nature. From this source one learns, in a general way, why natural nitrate of soda has won general recognition as the standard nitrogen fertilizer.

There is a striking parallelism between the feeding of plants and animals. Investigators are constantly discovering new facts which clearly show that plant feeding does not differ very widely from animal feeding. In both, the growth-promoting and health-promoting properties of natural foods are fully recognized. Many soil and crop specialists are gradually being convinced that natural products used as fertilizers have growth-promoting properties not possessed by artificial materials. Though an artificial fertilizing material may be very pure, its purity does not necessarily mean that it has greater fertilizing value. On the contrary, the purity of an artificial or synthetic product may mean the absence of certain natural constituents that are very necessary in plant growth. Scientists are giving more recognition to the beneficial effects on crop growth of traces of certain natural substances in fertilizers. Traces of manganese and iodine in Chilean

RESULTS WITH CHILEAN NITRATE IN APPLE ORCHARDS (1927)

Location of Orchard.	Variety.	Age of Trees. (Years.)	Culture.	Number of Trees Fertilized.	Quantity Chilean Nitrate Per Tree. (Lbs.)	Yield from Fertilized Trees.	Yield from Same Number Unfertilized Trees.	Percentage Increase. (Per Cent.)	Profit Above Cost of Chilean Nitrate.
New York—									
R. W. Westlake, Middle Hope...	McIntosh	12	Strip	25	6	148 bu.	100 bu.	48	$ 66.90
Fred Nesbitt, Albion.....	King	45	Clean	10	10	27 bbls.	17 bbls.	58	31.80
E. W. Mitchell, Stuyvesant Falls..	Ben Davis	30	Strip	22	8	128 bbls.	70 bbls.	82	110.72
Jesse Robertson, Holley.....	Baldwins	52	In sod	12	10	34 bbls.	9 bbls.	277	73.54
Fred Van Buren, Schenectady..	McIntosh	16	Cropped	12	5	32.5 bbls.	27¼ bbls.	19	24.21
Wilson & Jones, Hall.....	McIntosh	16	Strip	31	5	59.5 bbls.	16.5 bbls.	260	278.45
J. M. Merritt & Sons, Slate Hill.	McIntosh	11	Clean	15	4	36.5 bbls.	20.5 bbls.	78	104.96
Willis W. Post, Catskill.....	Sutton Bty.	26	In sod	10	6	39 bbls.	22.5 bbls.	73	54.06
H. E. Heyworth, Peru.....	McIntosh	15	In sod	10	5	30 bu.	17 bu.	76	21.17
L. H. Vaughn, Pavilion.....	Baldwins	56	In sod	8	12	68 bu.	40 bu.	70	11.12
F. N. Burroughs, South Cairo....	McIntosh	12	Strip	8	5	25 bbls.	20 bbls.	25	33.64
Herbert J. Smith, Hilton.....	Baldwins	8	In sod	8	12	103 bbls.	49 bbls.	110	38.59
Northern Orchard Co., Peru.....	McIntosh	15	In sod	20	8	181 bu.	108 bu.	67	239.55
Fred Hazelton, Le Roy.....	N. Spy	26	In sod	10	8	61.5 bu.	43 bu.	43	33.51
C. R. Tabor, Milton.....	McIntosh	15	Clean	6	5	73 bu.	55.5 bu.	31	42.73
E. W. Mitchell, Stuyvesant Falls.	Baldwins	30	Strip	37	8	48 bbls.	37 bbls.	29	26.52
John S. Rich, Marion.....	Ben Davis	14	Strip	5	5	30 bu.	20 bu.	50	7.17
Datus Clark & Sons, Peru.....	McIntosh	16	In sod	9	10	73 bu.	58 bu.	25	42.30
Champlain Val. Orchard Co., Peru	McIntosh	14	Strip	16	5	103 bu.	82 bu.	25	60.60
Champlain Val. Orchard Co., Peru	McIntosh	14	Strip	10	10	53 bu.	20 bu.	165	96.00
John Sullivan, Peru.....	McIntosh	16	In sod	10	10	72 bu.	58 bu.	24	20.18
Grover Kling, Voorheesville	Baldwins	30	In sod	6	10	10 bbls.	2 bbls.	400	21.60
Ward Crofoot, Pavilion.....	Baldwins	55	In sod	7	10	29 bu.	9.5 bu.	205	10.08
E. N. Thompkins, Medusa	R.I.Gre'nings	28	In sod	6	10	6 bbls.	2 bbls.	200	9.60
Charles G. Smith, Medina	Baldwins	50	Clean	10	10	26¾ bbls.	21 bbls.	26	10.24
Daniel Higgins, Kendall.....	Mixed	17	Clean	10	6	17 bu.	8 bu.	112	6.72
Homer Breed, Lyndonville	Baldwins	36	Clean	6	10	25 bbls.	10 bbls.	150	43.08
W. I. Dennis & Son, Clyde.....	Black Twig	18	In sod	22	5	43 bu.	31.5 bu.	36	7.87
Bert Robertson, Holley	Baldwins	19	In sod	8	4	15 bu.	7 bu.	114	6.94
*L. J. P. Richards, Lockport	Baldwins	41	In sod	11	15	61 bu.	13 bu.	369	38.40
Avery Skutt, Morton	McIntosh	13	Clean	28	3	21 bbls.	18½ bbls.	14	10.56
Frank Bumpus, Victor	R.I.Gre'nings	20	In sod	13	5½	61 bu.	52 bu.	17	9.77
R. W. Stephenson, Sauquoit	McIntosh	16	Strip	14	5	31 bu.	26 bu.	19	7.20
Floyd Sigler, Hamlin	Baldwins	40	Clean	6	10	78 bu.	46.5 bu.	67	25.62
Roy W. Hiler, Walker	20-Ounce	20	Clean	18	4	65 bbls.	52 bbls.	25	16.98
A. N. Beal, Victor	McIntosh	15	Strip	22	5	20 bbls.	12 bbls.	66	50.90
Jesse H. Clark, Newfane	Baldwins	18	Clean	14	8 61 5/6 bbls.	39½ bbls.	58	41.08
M. C. Burritt, Hilton	N. Spy	18	Clean	33	6	226.5 bu.	199.5 bu.	13	21.99
A. N. Beal, Victor	McIntosh	14	Strip	22	5	64 bbls.	36 bbls.	77	163.60
Redman Bros., Hall	R.I.Gre'nings	45	In sod	16	5–8	60 bu.	9 bu.	566	.....
Frank McOmber, Albion	Baldwins	50	In sod	10	12	67 bbls.	34 bbls.	97	45.00
A. George Wright, Medina	Baldwins	40	In sod	5	12	101 bu.	78 bu.	29	11.16
Connecticut—									
Roy Newton, Kent	Baldwins	15	In sod	8	8	55¼ bu.	17.5 bu.	215	54.44
E. Kent Hubbard, Middletown...	Baldwins	10	In sod	24	4	159 bu.	63 bu.	152	77.64
Wm. H. Elliott, Central Village..	Baldwins	20	In sod	12	7	160 bu.	136 bu.	17	20.98
H. G. Cook, Branford	McIntosh	15	Strip	34	3¾ 731.5 bu.	581.5 bu.	25	295.95
Geer Brothers, Leonards Bridge.	Baldwins	30	In sod	5	5	71 bu.	43 bu.	65	34.15
L. H. Lindeman, E. Woodstock..	Baldwins	14	In sod	7	10	36 bbls.	6.5 bbls.	453	108.17
B. Villa, South Glastonbury	Baldwins	21	In sod	12	14	145 bu.	48 bu.	202	112.87
Massachusetts—									
H. S. Ashley, East Longmeadow.	Baldwins	17	In sod	13	10	18 bu.	Nothing	..	17.95
Henry Hanks, Worcester	McIntosh	18	In sod	5	11	99 bu.	73 bu.	35	36.91
F. H. & P. J. Kingston, Charlton.	Wolf River	11	In sod	7	3	80.5 bu.	63 bu.	27	25.51
Adams & Dean, West Boylston..	Baldwins	56	In sod	10	15	33 bu.	12 bu.	175	21.75
Lester Pease, Templeton	McIntosh	13	Clean	12	7	14.5 bu.	9¾ bu.	48	8.72
Thomas Baird, Tyngsboro	McIntosh	13	In sod	6	10	46 bu.	26 bu.	76	57.75
Lester N. Pease, Templeton	Wealthy	13	Clean	12	6	13.5 bu.	10 bu.	35	1.67
West Virginia—									
Rumsey Smith, Hanging Rock ..	Rome B't'y	14	Clean	8	5	96 bu.	80.5 bu.	19	20.05
J. E. Everette, Berkeley Springs.	R. Delicious	11	In sod	8	5	38 bu.	18 bu.	111	38.80
Cecil Wood, Hedgesville	Grimes Gold.	15	Clean	12	4	72 bu.	48 bu.	50	34.56
George Wirgman, Romney	Delicious	14	In sod	10	4	30 bu.	25 bu.	20	5.05
E. J. Shawen, Romney	York Imp.	24	In sod	6	6	138 bu.	108 bu.	27	34.02
T. H. Bury (manager), Romney.	York Imp.	15	Clean	8	4	40 bu.	32 bu.	25	9.84
L. D. Bosley, New Creek	Grimes Gold.	22	In sod	6	4	36 bu.	6 bu.	500	36.78
G. W. Biser, Berkeley Springs...	York Imp.	18	In sod	8	5	44 bu.	32 bu.	37	13.80
Walter Bosley, New Creek	Baldwins	15	In sod	5	4	20 bu.	12 bu.	66	7.40
Hon. Gray Silver, Martinsburg..	York Imp.	19	In sod	5	5	25 bu.	21.5 bu.	16	3.97
Glen Petzer, Martinsburg	York Imp.	25	Clean	6	6	188 bu.	144 bu.	30	64.92
Will McQuilkin, Shepherdstown..	Stayman	16	In sod	6	4	72 bu.	52 bu.	38	32.28
E. F. McDonald, Inwood	Jonathan	12	Clean	10	5	32 bu.	17.5 bu.	82	20.25
C. E. Miller, Berkeley Springs...	Ben Davis	20	Clean	6	5	30 bu.	23 bu.	30	7.85
Frank Miller, Berkeley Springs..	York Imp.	17	Clean	7	4	70 bu.	62 bu.	12	9.16
C. N. Miller (f'r'm'n), New Creek	York Imp.	17	Clean	10	4	80 bu.	60 bu.	33	23.80
G. Beale (mgr.), Falling Waters.	N.W.Green.	18	Clean	12	6	60 bu.	48 bu.	25	21.84
Virginia—									
T. M. Richards, Winchester ...	York Imp.	24	Strip	8	5	48 bu.	33 bu.	45	17.55
J. W. Rosenberger, Winchester..	York Imp.	24	In sod	8	6	56 bu.	50 bu.	12	6.06
J. H. Funkhouser, White Post ..	York Imp.	17	Clean	15	5	96 bu.	84 bu.	14	12.75
Harry C. Warden, Berryville	York Imp.	18	Clean	7	5	84 bu.	67.20 bu.	25	24.15
Lewis & E. E. Allen, Rippon....	York Imp.	13	In sod	6	4	30 bu.	18 bu.	66	14.28
E. L. Lupton, Winchester	York Imp.	28	Alfalfa sod	4	6	36 bu.	30 bu.	20	6.78

*Although the gain was only 12 per cent in 1926 in Mr. Richards' orchard, New York, the carry-over effect without additional fertilizer was 369 per cent in 1927.

POSITION WANTED

WANTED—POSITION AS MANAGER OF ORchard—either grapes or apples. Seven years' experience. References. Address Box-121, American Fruit Grower Magazine.

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nitrate are good examples. It is believed that the striking growth-promoting properties of a natural product used for food for either animals or plants are due, in a large measure, to traces of certain substances supplied by nature.

Nitrogen for Fruit Trees

A general survey of the fruit-growing industry would probably reveal the fact that most fruit growers use only nitrogen fertilizer. Such a fact would show one of two things; either the growers have found by experience that nitrogen fertilizers are most profitable, or they are applying the knowledge obtained by horticultural scientists. Furthermore, the general use of nitrogen fertilizers may mean that leading growers combine scientific knowledge and practical experience for successful fruit production.

Knowledge of the use of nitrogen in fruit-growing is not very old—not yet 25 years—so that we might well suppose that many fruit growers are still adhering to the old idea that fruit trees should be fertilized in the same manner as ordinary farm crops. Of course, fruit trees use such elements as phosphorus and potassium in their growth and development; but in fertilizing for fruit production, nitrogen has proved by far the most important element. Investigators have shown that potash, phosphate, and lime are seldom required by orchard trees.

The discovery of the value of nitrogen is most interesting. It is said that an enthusiastic experimentor added some Chilean nitrate to a spray mixture with a view to determining its effect on the buds. He found that the trees so treated produced large increases in yield; but it was found that the increased yield was not the result of the contact of Chilean nitrate of soda with the buds, but rather its accidental effect as a fertilizer when it fell to the ground under the trees.

The accidental discovery of the value of nitrogen to fruit trees marked the beginning of rational fertilizer practice in orchards. Here again Chilean nitrate proved its value as the standard nitrogen fertilizer. Its recognition as the standard nitrogen fertilizer means two things; it gives best returns and highest profits, and it gives the best assurance of positive results. The dependability of Chilean nitrate in fruit production may be noted by the results shown in the accompanying table, which were obtained from demonstrations in apple orchards in New York, Connecticut, Massachusetts, West Virginia, and Virginia.

These demonstrations were conducted in 1927 by fruit growers in co-operation with county agricultural agents. The nitrate was applied early in the spring, about the time when the buds began to swell. It was broadcast about the trees, over a ground area equal to about twice the spread of the branches. In studying these results, it should be kept in mind that the profit indicated in the last column is based on the return from the number of trees fertilized and not on the returns per acre.

Necessity of Guarding Productivity of Fruit Trees

In the profitable production of fruit, the most important problems are to bring young trees into productive bearing and to maintain the productivity of each tree. It is generally conceded that the best way to meet the first problem is to give special attention to the feeding requirements of trees during their growing period, and that the maintenance of productivity depends primarily on the ability of trees to obtain sufficient nitrate nitrogen. A productive tree is healthy and vigorous—it has the necessary equipment to make it productive, namely, dark-green leaves, healthy bark, a good growth of terminal wood, and strong spurs.

As it is a general tendency of trees to produce, the highest degree of success in fruit production is attained when a fruit grower learns how to meet the natural demands of each of his trees. The truth of this is very strikingly shown by the performance of some fertilized and unfertilized trees in the Wilson and Jones apple orchard, of Hall, Ontario county, New York. (See illustration on page 6.) The picture shows comparative results with and without Chilean nitrate this year. These results, though almost unbelievable, show the actual facts. The 159-bushel yield is from 31 McIntosh trees (to left), each fertilized with five pounds of Chilean nitrate; and the four-bushel yield is from the 31 McIntosh trees (to right) which received no nitrate.

The results shown have added interest when the history of these trees is known. Briefly, it is this. Eight years ago, Charles S. Wilson returned to his father's farm and assumed management of the apple orchards which were not giving satisfactory returns. After trying many ways to make the orchards yield more profitably, Mr. Wilson tried Chilean nitrate. This was in 1925. He selected two rows of McIntosh trees (31 trees in each row) and around each tree in one row he applied four pounds of Chilean nitrate. The 31 trees in the other row received no nitrate.

During the first year (1925), which proved an unfavorable season, no definite conclusions could be drawn from the results obtained.

In 1926, the 31 trees which received Chilean nitrate yielded 39 barrels of apples, and the trees which received no nitrate yielded a total of only nine barrels.

In 1927, the 31 fertilized trees received five pounds of Chilean nitrate, and they gave a total yield of 59 barrels of apples. The 31 unfertilized trees gave a total yield of only 15.7 barrels.

The comparative results for 1928, shown in the picture, are from the same two rows of trees. Chilean nitrate was the only fertilizer used.

These are striking results, to be sure. But they illustrate in a very practical way how profitably orchard trees will produce when they are kept sufficiently supplied with nitrate nitrogen, and how unproductive trees may become when they are deprived of this plant food which they need so much.

Doctor Auchter to Head New Horticultural Office

DR. EUGENE C. AUCHTER, for the past ten years head of the Department of Horticulture of the University of Maryland, has been appointed principal horticulturist in the United States Department of Agriculture to take charge of the newly created office of horticultural crops and diseases.

Figures collected by the division of agricultural co-operation show there are now more than 12,000 co-operative associations engaged in the marketing of farm products and purchasing of farm supplies. These associations have a combined membership of about 2,000,000 farmers and do an annual business of approximately $2,500,000,000.

Books for Fruit Growers

ORCHARDING
By V. R. Gardner, F. C. Bradford and H. D. Hooker. A comprehensive survey of the entire field of modern fruit growing; a sketch of the functioning of fruit trees; an outline of the methods and problems of the fruit industry. The book opens with a discussion of tree structure, tree growth and fruiting habits, etc., and then takes up in logical sequence such topics as treating winter-injured trees, grafting, nursery practices, the place of pruning in orchard practices, orchard ills, spraying schedules, transportation and refrigeration, marketing, and a bird's-eye view of orcharding as a business. 311 Pages, Ill., $3.00.

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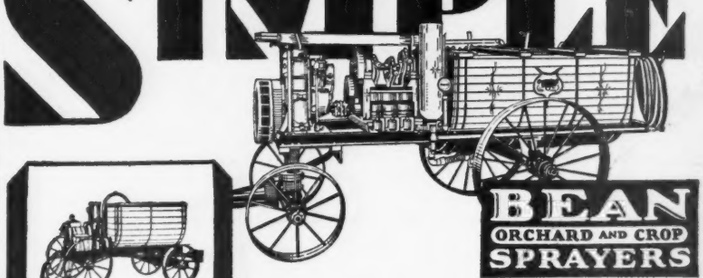

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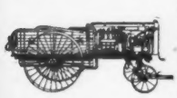

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The concerns whose advertisements appear listed below are equipped to give prompt and satisfactory service to the American fruit grower. Most of them issue literature that is freely at the disposal of our subscribers. It is to the advantage of all that when writing to an advertiser you use the address exactly as it appears in the advertisement, and that you state in your letter: "I Read Your Advertisement in AMERICAN FRUIT GROWER MAGAZINE."

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There is a neighbor living near you, a fruit grower. You know he is trying to do his best, for he frequently asks you what to do and when to do it, and you are always glad to give him the information.

If you think he would be benefited by the expert advice he would receive every month through the AMERICAN FRUIT GROWER MAGAZINE, why not call it to his attention? He would thank you for the courtesy.

When you are through reading this issue, loan this copy to that neighbor, first placing a big black "X" in the margin opposite this coupon. He'll get the point and grasp this opportunity to better his methods. Better reach for your pencil and do it now.

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53 West Jackson Boulevard, Chicago, Illinois

Gentlemen: I enclose a dollar. Send me AMERICAN FRUIT GROWER MAGAZINE three years.

Name .....

Address .....

Coming Horticultural Meetings

ANNUAL MEETING Peninsula Horticultural Society, Camden, Del., January 29-31, 1929. Secretary, J. F. Adams, Box 425, Newark, Del.

Annual meeting Illinois State Horticultural Society, Urbana-Lincoln Hotel, Urbana, December 12-14. Secretary, H. W. Day, Centralia.

Annual meeting Northern Illinois Horticultural Society, Mt. Morris, Ogle County, Ill., December 6-7. Secretary, R. A. Green, Ottawa, Ill.

Winter meeting Indiana Horticultural Society, Indianapolis, December 6-7. Secretary, Doyle Zaring, Lafayette, Ind.

Sixty-first annual meeting Kansas State Horticultural Society, State Capitol, Topeka, December 5-7. Meeting to be held in conjunction with annual meeting of Kansas Associated Garden Clubs and Kansas Nurserymen's Association. Secretary, James N. Farley, Hutchinson.

Annual meeting Kentucky State Horticultural Society, Lexington, December 18-19. Secretary, Ben E. Niles, Henderson.

Annual meeting and apple show Massachusetts Fruit Growers' Association, Worcester, January 8-10. Secretary, William R. Cole, Amherst.

Winter meeting and exhibits Michigan State Horticultural Society and Michigan Apple Show, Klingman Exposition Building, Grand Rapids, December 4-6. Secretary, H. D. Hootman, East Lansing.

Annual winter meeting Missouri State Horticultural Society, Missouri Hotel, Jefferson City, January 30-31. Meeting will celebrate seventieth anniversary of the founding of the society. Elaborate apple display to be staged in State Capitol. Premiums amounting to approximately $800 will be available. Secretary, Patterson Bain, Jr., Columbia.

Annual meeting Nebraska State Horticultural Society, College of Agriculture, Lincoln, January 8-10. Secretary, E. H. Hoppert, College of Agriculture, Lincoln.

Annual meeting and exhibit New Jersey State Horticultural Society, Chalfonte-Haddon Hall, Atlantic City, December 4-6. Secretary, Arthur J. Farley, New Brunswick.

Seventy-fourth annual meeting and exhibit New York State Horticultural Society, Rochester, January 16-18. Secretary, Roy P. McPherson, Le Roy, N. Y.

Winter meeting Ohio State Horticultural Society, Horticultural Building, Ohio State University, Columbus, February 4-7, in connection with annual Farmers' Week meetings. Secretary, F. H. Beach, Columbus.

Annual meeting Oregon State Horticultural Society, Roseburg, December 12-14. Secretary, C. L. Long, Corvallis.

Annual meeting Pennsylvania State Horticultural Association, Harrisburg, January 16-18. Secretary, S. W. Fletcher, State College.

Annual meeting Rhode Island Fruit Growers' Association, Providence, January 11. Secretary, Richard M. Bowen, Apponaug.

Thirty-ninth annual meeting South Dakota State Horticultural Society, Watertown, January 8-10. Secretary, N. E. Hansen, Brookings.

Annual meeting Tennessee State Horticultural Society, Hotel Hermitage, Nashville, January 16-17. Apple show to be held in connection with meeting. Secretary, G. M. Bentley, Knoxville.

Annual meeting Tennessee State Beekeepers' Association, Hotel Hermitage, Nashville, January 18. Secretary, G. M. Bentley, Knoxville.

Annual meeting Virginia State Horticultural Society, George Washington Hotel, Winchester, December 11-13. Secretary, W. S. Campfield, Staunton.

Twenty-fourth annual meeting Washington State Horticultural Association, Wenatchee, December 3-5. Secretary, J. I. Griner, Olympia.

Winter meeting Western Nut Growers' Association, Vancouver, Wash., December 5-7. Secretary, C. E. Schuster, Corvallis, Ore.

Annual meeting Wisconsin State Horticultural Society, Milwaukee Public Museum and Library, Milwaukee, December 5-7. Fruit, flower and vegetable show to be held in connection with meeting. Secretary, H. J. Rahmlow, 119 E. Washington avenue, Madison.

American Honey Producers' League, Sioux City, Ia., February 7-9. For detailed information write to J. V. Ormond, Little Rock, Ark.

The Use of Sulphate of Ammonia

(*From Page 4*)

The nitrogen application was 128 pounds sulphate of ammonia, applied evenly over the ground, with an additional four-fifth pound per tree scattered under the branches. There was also a basic application of 200 pounds superphosphate per acre, to fertilized and check plots alike.

The results for five years show that the sod mulch plot yielded on an average 319.3 pounds of apples per tree, as against 105.3 pounds for the check plot, a gain over check of 214 pounds per tree, or 203 per cent. The tillage-cover crop fertilized plot averaged 374.4 pounds per tree, as against 100.2 for the check plot, a gain of 247.2 pounds per tree, or 247 per cent. This is particularly interesting as the advantage in nitrogen for apple trees is usually considered to lie with the sod mulch system.

TABLE I

The higher yields for similar amounts of fertilizer correspond in each instance to the early application.

Pounds Per Tree Per Year — Sulphate of Ammonia	Pounds Per Tree Per Year — Nitrogen Equivalent	Time of Application	Average Gain Over Check Bushels per Tree
3⅜	0.75	Extra early	1.0
3⅜	0.75	Early	1.8
7¼	1.50	½ extra early ½ June	4.9
7¼	1.50	Extra early	3.4
7¼	1.50	Early	5.6
10⅞	2.25	⅔ extra early ⅓ June	6.3

TABLE II

Four-year average yields from different amounts of nitrogen applied to a 24-year-old York Imperial orchard in non-legume sod, 1924-25-26-27.

Time of application	Nitrogen application per tree per year — 0.75 lbs. No. of trees	0.75 lbs. Bus. per tree	0.75 + 0.75 lbs.* No. of trees	0.75 + 0.75 lbs.* Bus. per tree	1.50 lbs. No. of trees	1.50 lbs. Bus. per tree	1.50 + 0.75 lbs.* No. of trees	1.50 + 0.75 lbs.* Bus. per tree
Extra early	9	6.92	10	8.92	9	8.38	12	10.40
Early	14	6.82			11	9.74		

*Additional application made in late May or early June.

Nitrogenous Fertilizers in Apple Orchards

(From Page 3)

the orchard that has already been referred to, the apples in 1924 on the nitrogen fertilized trees were actually smaller in size than apples on adjacent trees with the same load of fruit and not fertilized.

Fertilized trees generally carry a heavier crop and are smaller in consequence unless thinned. The writer has seen over-vigorous York Imperial trees setting and bringing to maturity clusters of apples of four and even five in number. Under such conditions thinning is essential if a marketable product is to be obtained.

Most fruit growers believe that nitrogen discourages color production. In the West Virginia experiments this has been uniformly true, particularly when generous applications have been made and the early fall weather has been rainy and temperatures have been above normal for that season. In a season like the past one when conditions have been almost ideal for high color production, this deterrent effect of nitrogen on color production was not so noticeable but nevertheless present. The writer admits that under certain conditions moderate applications of nitrogenous fertilizer may increase color but only on very undervigorous trees—trees that drop their leaves prematurely due to poor nutritional conditions.

Apple buyers have been complaining for several years that apples from trees fertilized with nitrate of soda or sulphate of ammonia do not keep as well as those from trees not fertilized. Unfortunately, the experiment stations have no experimental data on this problem. The West Virginia experiment station and several other stations have initiated investigational work which it is hoped will give information as to the relation of nitrogen fertilization to keeping quality.

What can the orchardist do to obviate these possible ill effects from the use of readily available nitrogen and still get the undeniably beneficial effects? Probably the best advice that can be given is that he avoid the excessive use of these fertilizers. The application of large amounts may increase his yield, but it will not increase his yield of well-colored fruit. In these years of heavy production and keen competition between sections, growers must pay more attention to quality and think less of quantity. The consumer already knows that well-colored fruit is more attractive. He is now learning that it also tastes better and keeps longer than poorly colored fruit, and he is going to be willing to pay a premium for it.

Time of application is another important consideration. The early applications have less of a deterrent effect on color and the greatest effect on set of fruit and on growth. In West Virginia the best growers apply it just after the delayed dormant spray—particularly with varieties that set lightly, like Stayman, Delicious and Rome. With varieties that normally set heavily, like York, Ben Davis and Transparent, application may be delayed until a few days before bloom.

A fall application is being made by some growers. Experimental evidence is lacking, however, as to its relative merits when compared with a spring application. Nitrogen applied in the fall does not seem to affect color as much as a spring application. On the other hand, it probably does not increase set as greatly. Some growers have felt that fall applications might retard color production on the maturing crop. The writer had the opportunity to make careful observations on this last fall on Stayman, but could observe no such effect. It should again be emphasized that the weather this fall was very favorable for color production.

With nitrogen fertilization should go a rational system of orchard soil management. Nitrogen is not a cure-all. It will not take the place of moisture, so practices must be followed to prevent soil moisture deficits.

Pruning is also important. The more we fertilize, the more we must prune, because of the increased growth that makes the tree more dense.

Care of Fruit Seed

THE HOUSEWIFE'S plan of putting a peach pit out of doors under a stone has been the occasion of many a jest, but the practice is sound both theoretically and practically if the peach pit is expected to germinate the following spring, says H. B. Tukey, horticulturist at the New York Experiment Station at Geneva. The same pit held indoors over winter would not germinate when planted in the spring, although if left undisturbed it would probably germinate a year later.

Some seeds, such as corn and wheat, will germinate as soon or almost as soon as they are mature, according to Mr. Tukey. In fact, tomato seed will germinate although gathered in an immature condition. But in the case of seeds from the hardy fruits, like the apple, peach, pear, cherry, and plum, the seeds will not germinate for years until certain changes have taken place within them which are closely approximated to nature by the moist cool conditions to be found in the soil during winter. Nurserymen recognize these principles and either plant their seed in the fall of the year or else bury it out of doors in sand in a well-drained, vermin-proof place.

Because of this practice, it has come to be believed that fruit seeds must be frozen before they will germinate. This is not true. Actually, most seeds are not improved and are often injured by freezing. The after-ripening processes are carried on best at temperatures slightly above freezing and in the presence of moisture. If seed is kept frozen it will not after-ripen. If it is kept dry it will not after-ripen. The best conditions are those provided by nature in late fall or early spring when the ground is moist and just above the freezing point.

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American Fruit Grower Magazine for December

ADDITIONAL FRUIT PROFITS is a worthy end toward which the grower will persistently direct his efforts. In this issue the subject of Fertilizers in their relation to increased fruit profits is taken up from several angles, but always with the idea in view of increasing the net income to the grower, by a more scientific treatment of the subject of feeding the fruit tree.

More Fruit Profits in Commercial Fertilizers

There are three methods by which the increased profits from fruit production may be assured to the grower. These may be roughly segregated under the heads of: 1, increasing the price of fruit; 2, lowering the cost of production; and 3, increasing the production without a corresponding increase in the cost of production.

The first method may be well dropped from serious consideration for lack of any workable plan that will accomplish the desired result. The second seems equally impractical at present, as the general trend of production costs appears to be on the increase rather than on the decrease. This leaves the third possibility of increasing production, and here appears to be a practical source of increased fruit profits.

A recent survey made by AMERICAN FRUIT GROWER MAGAZINE gave indication that some forty per cent of the fruit farms of America are operated without the use of commercial plant foods. It is possible, but highly improbable, that sufficient animal manures are available on an appreciable percentage of these farms. But any method of figuring will lead to the inescapable conclusion that more than half the fruit plantings on our American farms are underproductive by reason of insufficient fertility.

Experience has shown that the results from fertilizing fruit plantings are immediate and noticeably profitable. Some outstanding instances are related in articles appearing in this issue.

A trip through any fruit section of the United States makes one fact apparent—the growers who are making money—who regularly market profitable crops, are those who make regular, liberal applications of fertilizers to their fruit trees, plants and vines. And the reason is not far to seek.

The cost of giving an orchard, or a vineyard, or a small fruit plantation the proper pruning, spraying and cultivation is not influenced by the size of the crop. It costs as much to care for underproductive trees as for trees in the highest state of productivity—up to the time of harvest. The real profit in a fruit crop, other things being equal, is in the volume of the crop that exceeds the average production.

The timely application of fertilizers can increase the crop. The cost of the fertilizers is but a fraction of the value of the crop increase.

That our readers might have as complete a presentation of the subject of orchard fertility as possible, many angles of the subject have been considered in this issue. It was believed that a general knowledge of the sources of our more important plant foods would not only be interesting, but would aid our readers toward a clearer understanding of the entire subject.

Hence, in this issue, we have asked the manufacturers of some of the more important lines of plant foods to present to the fruit growers a story of the origin of their products—how they are derived or manufactured and what place they are designed to fill in aiding the grower toward more fruit profits.

In these articles representatives of the plant food concerns have been at pains to acquaint us with some interesting facts about their products, and in some instances have given specific instances of the profitable use by growers, in commercial orchard practice, of the various plant foods. We take this opportunity to express our appreciation to these concerns for their co-operation in making the presentation of the fertilizer question more interesting to all.

The absence from the pages of this issue of articles dealing with other fertilizers suitable for the fruit grower's profitable use is not to be taken as any prejudice for the fertilizers featured or against those not represented. A conscientious effort has been made in this issue to outline some of the benefits to be secured from supplied plant foods in fruit production. Available space sets a definite limit on the number of articles we can present in one issue. In succeeding issues further consideration will be given to such other fertilizers as experimental evidence shows them to be potential sources of fruit profits.

All of these concerns have a wealth of valuable literature designed to aid the commercial fruit grower in producing fruit at a greater margin of profit, and the forward-looking grower will profit by writing for this literature.

These observations are directed mainly at the growers who are not now using commercial plant foods. Those who have used fertilizers in fruit production are more apt to require a bit of caution against overdoing a good thing. To these especially, and to our readers generally, we recommend a close study of Doctor Knowlton's article, the first in this issue, as a practical summing up of the proper use of nitrogenous fertilizer.

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